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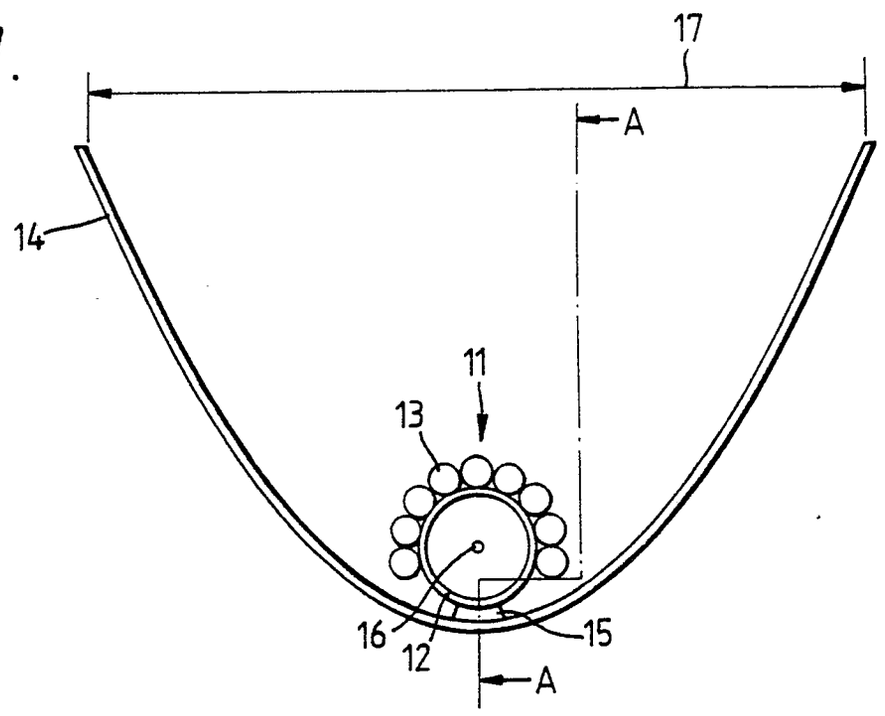
(54) Lighting devices.

(57) A lighting device comprises a cylindrical light carrier having a plurality of tubular self luminous light sources attached longitudinally along a surface and throughout a major arc of its circumference. In one embodiment the lighting device includes a parabolic reflector of elongate form.

Fig.1.



EP 0 344 900 A2

Lighting Devices

This invention relates to lighting devices and is particularly concerned with lighting devices using self luminous light sources in which a phosphor coating within a translucent envelope is excited to luminescence by a gaseous radionucleide such as tritium.

Such light sources are manufactured by the applicants under the Trade Mark "BETALIGHT" and Registered Trade Marks "SRDL" and "SRDL BETALIGHT", and are widely used in a range of self luminous signs where a tubular light source is supported along the optical centre of a parabolic reflector of elongate form.

It is essential to obtain efficient "flashing" of the surface of the parabolic reflector and this requirement dictates the minimum diameter of the self luminous light source depending on the width dimension between the reflector lips. For example, a reflector having a lip width of 19mm requires a light source having a minimum outside diameter of 5mm.

The larger the diameter of the light source the greater is the quantity of costly radioactive gas required to provide a useful light intensity, and the problem increases in the consideration of self luminous light sources for use in illuminating large areas. For example, it has been proposed to use self luminous light sources for airport runway markers having an illuminated area up to about 325 square inches.

Accordingly, in one aspect this invention provides a lighting device comprising a cylindrical light carrier and a plurality of tubular self luminous light sources having a smaller outside diameter than the outside diameter of the carrier attached longitudinally along a surface of the carrier and through at least a major arc of its circumference.

The self luminous light sources may be located on an external surface of the carrier which, preferably is a reflective surface.

Alternatively, the light carrier may comprise a transparent tube and the light sources may be located longitudinally along an internal surface. In such an embodiment the space internally of the self luminous light sources may be filled with a clear adhesive to retain the light sources in position.

The carrier may be supported in a parabolic reflector of elongate form with a geometral centre of the carrier coincident with the optical centre of the parabola.

In another aspect a lighting device comprises a parabolic reflector of elongate form having an optical centre, a cylindrical light carrier supported in the reflector with its geometral centre coincident with said optical centre and a plurality of tubular self luminous light sources having a smaller outside diameter than an outside diameter of said carrier attached longitudinally along a surface of the carrier and through at least a major arc of its circumference.

The invention will now be described by way of example only and with reference to the accompanying drawings in which,

Figure 1 is an end view of a lighting device constructed according to one embodiment of the invention,

Figure 2 is a fragmentary side elevation taken along lines A-A of Figure 1, and

Figure 3 is a fragmentary end view similar to Figure 1 showing an alternative embodiment.

Referring now to Figures 1 and 2, a lighting device 11 includes a cylindrical light carrier comprising a glass tube 12 having a reflective external surface. Nine tubular self luminous light sources 13 disposed in substantially parallel array are attached using a white silicon adhesive longitudinally of the external surface of the carrier 12 and through a major arc of the circumference of its external surface.

In the illustrated embodiment the lighting device 11 is used with a parabolic reflector 14 of elongate form having a lip width dimension 17 and a length 18. The device 11 is attached by an adhesive 15 internally of the reflector 14 so that the geometral centre, i.e. the longitudinal axis, of the carrier 12 is located coincident with the optical centre 16 of the parabola.

Each of the nine self luminous light sources has an outside diameter of 5mm requiring a total of 210 curie of tritium to provide the required intensity of light output. It is estimated that to provide a comparable light intensity over a similar area using a single annular self luminous light source would require about 270 curie, indicating that a useful saving is achieved by this invention.

In the embodiment of Figure 3 the tubular self luminous light sources 13 are located longitudinally internally of the tubular glass carrier 12. In such an arrangement in which the light sources 13 are located entirely around the internal surface they are self supporting and can be retained simply by filling the space 19 internally of the light sources with a clear silicon adhesive.

The actual diameter of the light carrier 12 in or on which the individual array of self luminous light sources 13 are mounted and the number of light sources 13 used will depend on the particular installation. It is envisaged also that the lighting de-

vice 11 could be used in certain installations independently of the illustrated parabolic reflector in which case the individual light sources 13 may be extended entirely around the external or internal diameter of the carrier 12.

In either case it is preferred that to effect maximum savings the external diameter of the individual self luminous light sources 13 does not exceed about 5mm. Apart from achieving a useful saving in the amount of gaseous radionucleide required to provide a desired light intensity over a given area the lighting device of this invention improves safety in that in the event of impact damage a proportion only of the full complement of gas may be released into the atmosphere. In addition, in an embodiment in which the individual light sources 13 are releasably attached to the carrier 12, it is possible to effect repair by replacement of one or more damaged light sources 13. Release of a light source 13 may be achieved by employing a suitable solvent.

Whilst several embodiments of the invention have been described and illustrated it will be apparent that many modifications may be made without departing from the scope of the invention as defined in the appended claims. For example, the light carrier 12 may be manufactured of any other suitable material such as a plastics material, aluminium or rubber, and may be formed with longitudinally extending grooves to facilitate assembly of the individual light sources 13. In some applications it may be possible to arrange the light sources 13 circumferentially spaced-apart to reduce the required number and effect a further saving of gaseous radionucleide in the assembly.

Claims

1. A lighting device comprising a cylindrical light carrier and a plurality of tubular self luminous light sources having a smaller outside diameter than the outside diameter of the carrier attached longitudinally along a surface of the carrier and through at least a major arc of its circumference.

2. A lighting device as claimed in Claim 1, further characterised in that the light sources are located on an external surface of the carrier.

3. A lighting device as claimed in Claim 2, further characterised in that the external surface is a reflective surface.

4. A lighting device as claimed in Claim 1, further characterised in that the light carrier comprises a transparent tube and the light sources are located longitudinally along an internal surface.

5. A lighting device as claimed in Claim 4, further characterised in that said light sources are retained by clear adhesive in the space internally of the light sources.

6. A lighting device as claimed in any preceding Claim, further characterised in that the carrier is supported in a parabolic reflector of elongate form with the geometral centre of the carrier coincident with the optical centre of the parabola.

7. A lighting device comprising a parabolic reflector of elongate form having an optical centre, a cylindrical light carrier supported in the reflector with its geometral centre coincident with said optical centre, and a plurality of tubular self luminous light sources having a smaller outside diameter than an outside diameter of said carrier attached longitudinally along a surface of the carrier and through at least a major arc of its circumference.

Fig.1.

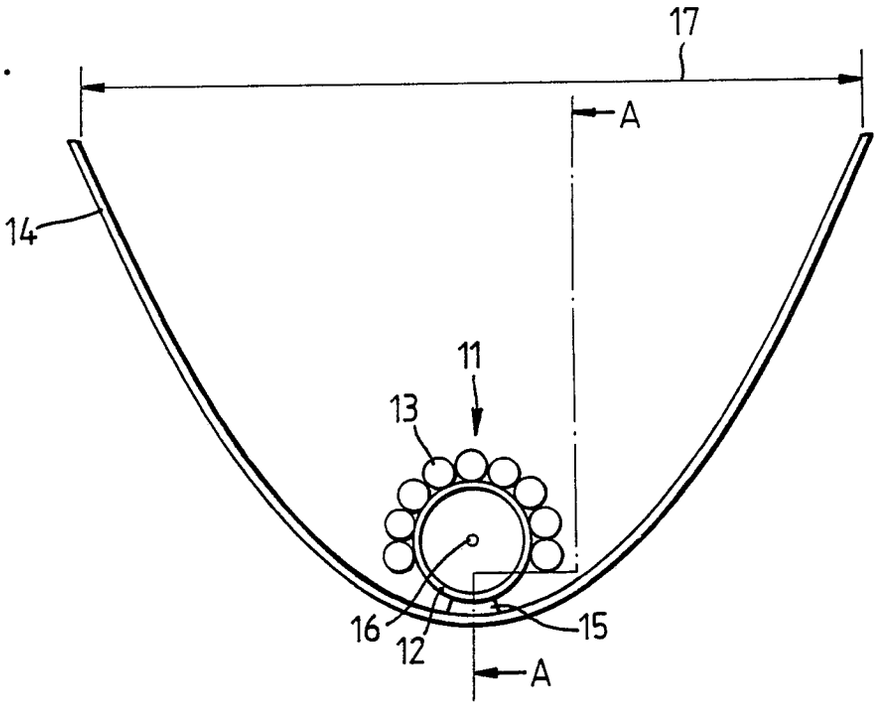


Fig.3.

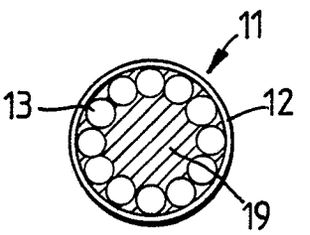


Fig.2.